

DOCUMENT RESUME

ED 206 924

CS 006 017

AUTHOR Jones, Ella D.  
TITLE A Comparative Readability Study of Certain College Textbooks.  
PUB DATE Apr 81  
NOTE 26p.; M. A. Thesis, Kean College of New Jersey.  
EDRS PRICE MF01/PC02 Plus Postage.  
DESCRIPTORS Comparative Analysis; Content Area Reading; Higher Education; \*Readability; \*Reading Research; \*Textbook Content; \*Textbook Research

ABSTRACT

Although the popular press has reported that college textbooks are becoming easier to read in response to the lowered reading skill level of entering freshmen, a recent study found that newer editions of college texts were more difficult to read than earlier editions of the same texts. A study was undertaken to determine which of the two views was correct. The Fry Readability Formula was applied to early and recent editions of three college textbooks. Three 100 word passages were randomly selected from each book, and the average number of syllables and the average number of sentences were counted. The results indicated that there was a difference in the readability of textbooks involving economics, sociology, and psychology over two editions of the same text--the later edition being the more difficult. Specifically, the later editions showed an increase in technical vocabulary and a decrease in space to develop concepts. (HOD)

\*\*\*\*\*  
\* Reproductions supplied by EDRS are the best that can be made \*  
\* from the original document. \*  
\*\*\*\*\*

U.S. DEPARTMENT OF EDUCATION  
NATIONAL INSTITUTE OF EDUCATION  
EDUCATIONAL RESOURCES INFORMATION  
CENTER (ERIC)

This document has been reproduced as  
received from the person or organization  
originating it.

Minor changes have been made to improve  
reproduction quality.

Points of view or opinions stated in this docu-  
ment do not necessarily represent official NIE  
position or policy.

A COMPARATIVE READABILITY STUDY  
OF CERTAIN COLLEGE TEXTBOOKS

by

Ella D. Jones

"PERMISSION TO REPRODUCE THIS  
MATERIAL HAS BEEN GRANTED BY

Ella D. Jones

TO THE EDUCATIONAL RESOURCES  
INFORMATION CENTER (ERIC)."

Submitted in partial fulfillment of the requirements  
for the Master of Arts degree in Education at  
Kean College of New Jersey

April 1981

ED200924

CS006017

TABLE OF CONTENTS

|                                   | <u>Page</u> |
|-----------------------------------|-------------|
| I. Abstract                       | ii          |
| II. Introduction                  | 1           |
| Hypothesis                        | 6           |
| Significance of the Problem       | 7           |
| Procedure                         | 9           |
| Results                           | 10          |
| Conclusion                        | 12          |
| Implications                      | 12          |
| III. Review of Related Literature | 15          |
| IV. References                    | 22          |

Contrary to public knowledge, the relationship of readability to reading success has been observed, debated, studied and compared for more than a century. During this period, moves toward improving communication seemed to evolve. Investigators observed the swing from the philosophical and antiquated methods of determining a variety of readings and text difficulties toward our now sophisticated formulas and graphs to measure "readability". Harris and Jacobson (1978) describes the period 1841-1968 as "a shift from an aristocratic to a democratic society that would result from mass publication. However," they continued, "mass publication would require mass literacy to insure that messages are not only communicated but are received and understood." In fact, the investigators pointed out that in 1841 Thomas Carlyle predicted that if printing was invented then the coming of a democracy would be inevitable. Thus, "printed messages must be readable to accomplish the inevitable change".

Further, historical evolutionary development of readability is identified by Harris-Jacobson (1978) in the works of Herbert Spencer (1892), Gunning (1968) and Gunning and Hirsh (1977). Although Spencer's article was written over a

century ago (1852), it is considered by Gunning and Hirsh as one of the most convincing introduction to the subject of readability. In this work Spencer "explained that a reader brings limited mental power to the task of comprehending writing. He or she uses it in three ways: 1) in understanding the words used, 2) in getting their relationship, and 3) realizing the thought conveyed." According to Gunning and Hirsh (1977) Spencer "anticipated syntactic and semantic features of readability". Syntactic dimension is exemplified in his work when he wrote "The longer the time that elapses between the mention of any qualifying member and the member qualified, the longer must the mind be exerted in carrying forward the qualifying member for use." The former not only exemplifies Spencer's syntactic dimension of readability but it represents another revolution in its evolutionary development.

Another motion in the swing from the purely philosophical method of determining reading difficulty is seen when Spencer developed semantic function. Spencer considered, for example, "'stupendous' more powerful than 'vast' because it allows the reader's consciousness more time to dwell on the quality per-

formed. Thus he recognized that even though a shorter word spares the reader effort and time, a shorter word could always serve the same semantic function."

If the former is so - and it seems to be - Spencer's accomplishments in the area of readability during his time most likely produced more for history than many researchers in the next two decades. The reasons are many. Chief among them is the fact that Spencer was so thorough. That thoroughness, however, forced him into making a difficult choice. He encountered this dilemma when he tried to use for example, "the single word economy to mean both "efficiency of effort to improve understanding" and "stylistic variety to achieve interest and delight". Can it be said that the nationalistic shift from Aristocracy to Democracy (Carlyle - 1841) influenced the velocity of language development to the extent that not even Spencer realized the impact of that growth until he tried to lump together affective and cognitive components? Spencer found out he could not combine them not even for emphasis. After more than a century the basic rule still exists.

Harris-Jacobson as well as many other researchers in the field of readability point to Spencer as the most successful

forerunner. In addition to the credits delineated Spencer contributed three other major variables to the development of readability. They are sentence length and syllable, abstract words and familiar words and short words. Today, the sentence length and syllable variable seem to be selected for readability formulas more often than the remaining variables. That is not to say that the remaining variables are not chosen often.

As the gap began to close between the nineteenth and twentieth century, it found many researchers selecting Spencer's variables to use in their readability formulas. The list that follows utilized his familiar word variable:

|                  |                                             |
|------------------|---------------------------------------------|
| Thorndike (1921) | Dale and Chall (1948)                       |
| Washburne (1928) | Spache (1953)                               |
| Dale (1931)      | Harris (1955)                               |
| Morphett (1938)  | Jacobson (1965)                             |
| Lorge (1944)     | Harris-Jacobson (1973, 1973,<br>1974, 1975) |

Although Spencer identified unfamiliar words as a factor which contributed to the reading difficulty of a passage there were no objective ways to distinguish familiar from unfamiliar words until Edward L. Thorndike's *Pioneering the Teacher's*

Word Book was published in 1921. This book contained a list of "10,000 words occurring most frequently in a word count of 41 sources including children's literature, elementary textbooks, newspapers, the Bible, classics, adult correspondence, etc." The next three decades after 1921 found Thorndike expanding his vocabulary count by 10,000 words per decade.

Most of the formulas listed above were designed and developed after World War II. Prior to World War II, Gray and Leary (1935) surveyed 300 librarians, publishers and readers who asked librarians for assistance, asking them what made a book readable (Maxwell, 1978). True, while only 5% of the responses could be measured objectively, they formed the basis for further development of readability formulas. However, the literature does not indicate follow up studies.

The literature does point to Rudolf Flesh as being the writer who revolutionized as well as popularize the concept of readability through his books and articles. However, formula developers found that computing Flesh's Formula was "too time consuming and somewhat difficult in the days before hand calculators" (Maxwell, 1978) and therefore, many investigators attempted to simplify Flesh's Formula. Among them were Dale-Chall (1948)

and Edward Fry (1968). Both formulas are widely used today to determine the readability of textbooks. According to Fry, college textbooks are no exception to the rule for readability analysis. He further states that "matching the level of the student with the level of the material" is the primary purpose for assigning readability to any book. On the basis of the former and Fry's Extended Graph this writer finds the Fry Graph most appropriate to compare readability of college textbooks.

Readability measures have been used for a variety of purposes including measuring the difficulty level of college text. Although the popular press report that college textbooks are becoming easier to read in response to the lowered reading skill level of entering freshmen, Santa and Burnstyne (1977) found that changes in readability occur from the older to the newer edition of certain college textbooks, that, in fact, the text studied were more difficult to read than earlier editions of the same text.

#### HYPOTHESIS

To determine which of the two views is correct, a study was conducted to determine the changes, if any, in selected college textbooks. According to Flesh's readability analysis (1948) new editions of selected college textbooks are more difficult to read

than former editions. Yet, published accounts in the popular press support the reverse.

### SIGNIFICANCE OF THE PROBLEM

Research has found that college students are most likely to succeed when college textbooks are written closest to their instructional level. Since Fry extended his readability graph to the college level, writers, publishers and teachers have available to them a measurement that can assist in closing the gap between the readability level of the textbook and the predicted instructional level of the student. This study will compare the readability of two editions of the same text in the areas of psychology, economics and sociology.

Research has shown that a need exists for a simplified readability formula for college textbooks. In a recent report by Edward Fry titled "Fry's Readability Graph: Clarification, Validity, and Extension to Level 17" (1977) the simplicity of his graph estimate was demonstrated as opposed to that of his colleagues. In addition it is indicated that the graphs simplicity and comparable accuracy is determined by the use of brevity. Brevity then becomes an asset when measuring a wide range applicable from grade one to grade seventeen. Readability of college textbooks was chosen

because few studies appear on this subject in the literature. However, the literature appears to be inundated with readability studies on the elementary and secondary levels. One such study conducted by Robert C. Auckerman (1965) investigates a readability method designed to indicate some direction for determining readability of secondary literature textbooks. Another study by Maurice Kurzman (1974) compared the reading ability of college freshmen to the readability of their textbooks. The findings of this study indicated to the writer that "college textbooks should be more carefully written and selected so as to meet the comprehension levels and the readability of their textbooks. In a recent study Kenneth Kavale, Alfred Hirshoren and J. T. Hunt (1976) assessed textbooks used in introductory reading courses: that of Gillen in Educational Psychology and Hirshoren, Hunt and Kavale (1976) in special education. This study found that textbooks used in introductory reading courses are found to be easier to read than textbooks used in other subject areas. A more recent primary study of readability levels of textbooks was done by Roger E. Johnson and Eileen B. Vardian (1980). This study evaluated the reading levels of sixty-eight social studies textbooks for grades one through six. The conclusion indicated that only some of the

textbooks are appropriate to the average reader while most texts require students to be above average readers. In addition, none are for the slow learner or low achiever.

### PROCEDURE

Donald O. Hebb's A Textbook of Psychology first and third edition (1958, 1972), Paul Samuelson's Economics eighth and ninth editions (1970, 1973) and Robert E. Park and Ernest Burgess' Introduction to the Science of Sociology first and third edition (1921, 1969) were selected because they have been among the best selling textbooks in this country for more than two decades. The dates of publication were verified through the use of the copyright dates recorded on each book.

The Fry Readability Formula was then applied. Three 100 word passages were randomly selected from each book. The average number of syllables as well as the average number of sentences were counted. Fry's Graph for Estimating Readability-Extended was used to plot the results of the average number of syllables and the average sentence length. The point on the graph where the average number of syllables and the average sentence length intersect indicates the approximate grade level of that book. A comparison of approximate grade levels of the textbooks

in each edition was made in order to determine whether or not a significant difference in readability existed between the newer or the former edition.

### RESULTS

As noted in Table I the readability levels of Psychology Text over two editions are 8th and 10th grades respectively.

Table I

#### Readability Levels of Psychology Textbooks

| Psychology                   | A TEXTBOOK OF PSYCHOLOGY | First Edition<br>1922 |                  |
|------------------------------|--------------------------|-----------------------|------------------|
|                              |                          | <u>Syllables</u>      | <u>Sentences</u> |
| 1st Hundred, Page 2          |                          | 167                   | 2.3              |
| 2nd Hundred, Page 101        |                          | 167                   | 4.0              |
| 3rd Hundred, Page 251        |                          | <u>155</u>            | <u>5.0</u>       |
| Readability Level 8th Grade  |                          |                       |                  |
| Psychology                   | A TEXTBOOK OF PSYCHOLOGY | Third Edition<br>1958 |                  |
|                              |                          | <u>Syllables</u>      | <u>Sentences</u> |
| 1st Hundred, Page 21         |                          | 156                   | 4.0              |
| 2nd Hundred, Page 119        |                          | 157                   | 3.0              |
| 3rd Hundred, Page 273        |                          | <u>137</u>            | <u>5.0</u>       |
| Readability Level 10th Grade |                          |                       |                  |

As noted in Table II the readability levels of Economics Text over two editions are 11th and 13th grades respectively.

Table II  
Readability Levels of Economics Textbooks

| Economics                    | ECONOMICS | Ninth Edition 1970 |                  |
|------------------------------|-----------|--------------------|------------------|
|                              |           | <u>Syllables</u>   | <u>Sentences</u> |
| 1st Hundred, Page 9          |           | 158                | 6.0              |
| 2nd Hundred, Page 163        |           | 163                | 5.0              |
| 3rd Hundred, Page 480        |           | 159                | 5.0              |
| Readability Level 11th Grade |           |                    |                  |
| Economics                    | ECONOMICS | Ninth Edition 1973 |                  |
|                              |           | <u>Syllables</u>   | <u>Sentences</u> |
| 1st Hundred, Page 9          |           | 172                | 4.3              |
| 2nd Hundred, Page 367        |           | 174                | 3.2              |
| 3rd Hundred, Page 841        |           | 150                | 6.0              |
| Readability Level 13th Grade |           |                    |                  |

As noted in Table III the readability levels of Sociology Text over two editions are 12th and 14th grades.

Table III  
Readability Levels of Sociology Textbooks

| Sociology                    | SOCIOLOGY | First Edition 1921 |                  |
|------------------------------|-----------|--------------------|------------------|
|                              |           | <u>Syllables</u>   | <u>Sentences</u> |
| 1st Hundred, Page 7          |           | 180                | 4.3              |
| 2nd Hundred, Page 489        |           | 171                | 5.1              |
| 3rd Hundred, Page 89         |           | 141                | 6.0              |
| Readability Level 12th Grade |           |                    |                  |
| Sociology                    | SOCIOLOGY | Third Edition 1969 |                  |
|                              |           | <u>Syllables</u>   | <u>Sentences</u> |
| 1st Hundred, Page 7          |           | 164                | 4.0              |
| 2nd Hundred, Page 419        |           | 170                | 3.2              |
| 3rd Hundred, Page 979        |           | 175                | 2.0              |
| Readability Level 14th Grade |           |                    |                  |

### CONCLUSION

The results of this study indicated that there is a difference in the readability levels of textbooks involving economics, sociology and psychology over two editions of the same text, the later edition being the more difficult. Tables I, II, and III show a two year difference in readability from the earlier to the later edition. They further reveal variation in both vocabulary and sentence structure. These variations as determined by Fry's Readability Graph confirms the findings of many other studies that describe changes in readability levels of college textbooks. The findings of this investigation concur with those found in Santa and Burstyne's (1977) study. Both evidenced significant changes in readability of certain college textbooks from the older to the newer edition. Specifically, the later edition of both studies showed an increase in technical vocabulary and a decrease in space to develop concepts. The inference is that vocabulary words become longer and more complicated and at the same time more concepts are developed in smaller spaces. There is evidence in the literature to support this inference.

### IMPLICATIONS

Authors and publishers are apparently unaware of changes in their later editions. They seldom consider the readability of the

students that will use them. Professors and faculty members are often unaware of students reading ability. Research as well as evidence in the popular press indicate that college students have serious deficiencies in reading and that they, on the average, have lower skill levels than the grade level designation of many of their texts. Professors need to take account of this disparity in their reading requirements and also in the kind of instruction provided. The popular press needs to question the validity of information they report and the reliability of their sources since there is no evidence in this study to support the notion that "textbooks are getting easier".

On the basis of the findings and implications of this study many recommendations or suggestions can be made. First, the criteria for selecting college textbooks should include matching the edition with the school population. One member of a committee charged with doing this should be a reading specialist. Since most text are faculty selected, they should either consult with a reading specialist or do readability studies on the present texts. Second, professors and instructors must learn the importance of matching his favorite textbooks with the reading ability of the students that will use them. Third, book selection committees should have the privilege to reject editions of textbooks that do not meet the

14.

requirements of school populations. Then and only then will authors and publishers modify their newer editions and make a conscious effort to stay within a determined readability level.

A COMPARATIVE READABILITY STUDY  
OF CERTAIN COLLEGE TEXTBOOKS

15.

The problem of determining reading difficulty of textbooks and matching same with students' ability has long plagued authors, publishers, instructors and educators as well. However, these persons have focused primarily on elementary and secondary textbooks. Studies considering the readability of college textbooks before the decade of the 60's had been few and far between. Since then, a number of studies have been made comparing the reading ability of college students with the readability of their textbooks.

Early in the sixties Major and Collette (1961) found in a nationwide survey of college general biology textbooks that the most frequently used and preferred textbooks were written beyond the reading comprehension of college freshmen.

Creamer's (1968) study found that while the students in a community college had an average ability on the 8th grade level, the textbooks they were using averaged between grade level 14 and 16.

Another comparison of community college students with the textbooks they used was done by Cline (1971). He conducted this study at a community college, at the University of Missouri. They utilized a total of 17 textbooks. The reading level of the students were determined by The Nelson-

Denny Test revised edition. The readability of the texts was determined by the Dale-Chall Readability formula (1948). It was found that "52 percent of the students studied had reading abilities below the grade-level placement of the textbooks used in their classes. The reading ability grade level for freshmen was 12.6 while the mean readability grade level of text was 13". As a result of this study the investigator made the following recommendations: (1) community college faculties review their means of textbook selection, utilizing a readability formula and/or analysis; (2) where a range of reading ability exist, two or three texts at different readability levels should be used; (3) other classroom aids should be used to augment and clarify text materials; and (4) reading and study skills programs should be instituted.

Gibson (1971) reported that Nelson-Denny Reading Test Scores of a sample of 200 California community college students indicated that 65% had poor reading ability, 24% average and 11% superior.

Kurzman (1973) reported in the literature the results of a pilot study dealing with 'Readability of Freshmen College Textbooks in the Social Sciences as Compared to the Reading Ability of Students Who Use Them'. The subjects

used for this study were 18 freshmen students who were taking courses in the social sciences at Herbert Lehman College, Bronx, New York. The Nelson-Denny Reading Test showed their average reading grade level to be 10.4. Twenty-three books in the social science areas were selected for appraisal. The grade-level placements of the textbooks were obtained from the Smog Formula, the estimates from two reading teachers and the estimates of the instructors whose books were being used. It was concluded that "only four books were on the freshmen level. Of the remaining twenty books, seven were on the fourteenth level, five were on the fifteenth grade level, six were on the sixteenth level and two were on the seventeenth level".

Another study conducted by Kurzman (1974) at Herbert H. Lehman College, Bronx, New York, attempted to determine the reading ability or level of college freshmen compared to the readability of their textbooks. This investigation was significant because it was motivated by a newspaper article published in the New York Times (July 15, 1973). The article described how the city university of New York changed its admission policy and opened its doors to all graduating high school seniors in the city regardless of their scholastic

record. The results of the study revealed that the average was about the 10th grade level. The readability level of many of the social science textbooks that were being used averaged around the 14th grade level. In his conclusion, Kurzman pointed out that students reading on a high school sophomore level usually find books written on a college sophomore level extremely difficult to comprehend.

Block: And Others (1976) studied the relationship between the reading abilities of 215 freshmen composition students and the readability of their college textbooks. Measures from the Nelson-Denny Reading Test and the Dale-Chall Readability Formula (1948) were used to assess the relationship between reading ability and the readability of the textbooks. Results indicated that 72% of the students were scoring at or above the freshmen reading level. Therefore, four out of six freshmen textbooks used in the study might be considered inappropriate for over one-fourth of the total student sample.

Jeremiah (1976) conducted a three-day survey of college textbooks for freshmen students to determine comprehension based on sentence type. It measured 968 sentences from 20 different college texts used by freshmen students. The survey revealed that active sentences were the most prevalent of

sentence types. The types that followed were passives, gerunds, pseudo clefts, factives, infinitives and clefts, respectively. The study revealed that students made mistakes more frequently in distinguishing actives from passives and vice versa. The author suggested that college teachers review basic sentence types with their students, as an aid to reading comprehension.

Reese (1976) assessed the effectiveness of a college reading compensatory education program. This study was designed to aid college students whose skills were not sufficient to meet the demands of required English and other courses in the basic studies curriculum. The reading course was required for students who scored below 550 on the SAT verbal subset and who scored poorly on the comprehension subtest of the Cooperative English Test. The subjects of this study included 154 freshmen and 88 transfer students. The course utilized college reading text, the student's content-area text, in addition to teacher-prepared materials. Post testing at the end of the semester indicated that all students made significant gains in comprehension.

Two experimental studies conducted by Santa and Burstyne (1977) at Douglas College, Rutgers University investigated

changes in selected college textbooks from the first to the latest edition. Only two introductory text were utilized, they were Samuelson's Economica and Hilgard Atkinson, and Atkinson's Introduction to Psychology. Because they have been and still are among the best selling textbooks in this country for more than two decades, the researchers selected them for their study. The first part of this study involved a readability analysis of various editions of the two books. They chose the Flesh analysis of readability (1948) not only because of its "long standing reputation" but also for its variables of syllable count and average sentence length that are included in most readability formulas. To determine the readability scores they randomly chose "thirty, one-hundred word samples from equally spaced intervals throughout each text. They followed the procedure specified by Flesh (1948) for determining the number of syllables per hundred words and the average sentence length per sample. The results of this study demonstrated that students learn less effectively from latest editions of both Psychology and Economics than they did from earlier editions.

A review of the available literature on the readability of many college textbooks indicate that there exist a wide gap between the readability of college textbooks and the reading

ability of many college students. In addition, it appears that the latest editions of textbooks are becoming more technical and therefore, more difficult. Moreover, more students are entering college with poor reading ability. What then is the solution? Kurzman (1973) concluded that "without special assistance on the part of the instructor, without special efforts to improve reading skills, or without high motivation on the part of the student, the disparity between the reading ability of the student and the readability of their texts can lead only to frustration".

### REFERENCES

1. Aukerman, Robert C., "Readability of Secondary School Literature Textbooks: A First Report", English Journal, September, 1965.
2. Block, Alan and Others, "The Reading Ability of College Students Versus the Readability of Their Text", Towson State College, Maryland, 1976, 30 p.
3. Cline, Terry A., "A Comparison of the Readability of Community College Textbooks with the Reading Ability of the Students Who Use Them", University of Missouri-Columbia, 1971.
4. Creamer, W. A., "A Comparison of the Readability of Community College Textbooks with the Students Who Use Them", Unpublished Manuscript, Gloucester County College, Sewell, New Jersey 1978.
5. Flesh, Rudolph, "A New Readability Yardstick", Journal of Applied Psychology, Vol. 32 (June 1948) pp. 221-33.
6. Fry, Edward, "Fry's Readability Graph, Clarification, Validity and Extension to Level 17", Journal of Reading, December 1977.
7. Gibson, W. D., "Relationship Between Difficulty Levels of Assigned English Text and Reading Ability of Community College Students", Dissertation Abstracts - International, June 1971, 31.
8. Harris, Albert-Jacobson, Milton, "A Framework for Readability: Moving beyond Herbert Spencer" (1978).
9. Jeremiah, Milford A., "Survey of College Textbooks for Freshmen Students (A Case for Comprehension)", Miami, Florida, 1976)
10. Johnson, Roger E. and Eileen B. Vardin, "Reading, Readability and Social Studies", Reading Teacher, May, 1980.

11. Kavale, Kenneth and Alfred Hirshoren, J. T. Hung, "Reading, Text Is It Readable?" Journal of Higher Learning, Spring, 1976.
12. Kurzman, Maurice, "Readability of Freshmen College Textbooks in the Social Sciences as Compared to the Reading Ability of Students Who Use Them", City University of New York, Bronx, New York, Herbert Lehman College, August, 1973, 31 p.
13. Kurzman, Maurice, "The Reading Ability of College Freshmen Compared to the Readability of Their Textbooks", Reading Improvement, 11 (1974), 13-25.
14. Major, Alexander, and Alfred Collette, "The Readability of College General Biology Textbooks", Science Education, 45 (1961), 216-24.
15. Maxwell, Martha, "Readability: Have We Gone Too Far?", Journal of Reading (1978).
16. Reese, Thelma Terdiman, "Effectiveness of a College Reading Program", ED. D. Dissertation, Temple University, Ann Arbor, Michigan, University Microfilms, P.O. 1764, 1976.
17. Santa, Carol M. and Burstyne, Joan N., "Complexity as an Impediment to Learning, A study of Changes in Selected College Textbooks", Journal of Higher Education, 48: 1977.